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Socio-Emotional and Developmental Impacts of the COVID-19 Pandemic on Young Children – A Systematic Review (2020-2025)

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ABSTRACT

This systematic review synthesized evidence from 13 studies (2020–2025) focusing on the impact of the COVID-19 pandemic on the socio-emotional development, school readiness, and behavioral outcomes of young children, as well as related parental and environmental factors. Across diverse designs and samples, findings indicated predominantly negative outcomes, including increased anxiety, aggression, emotional symptoms, language delays, reduced socialization, and declines in school readiness and life skills. However, some studies highlighted resilience, with reduced socio-emotional risks in certain cohorts, and benefits from enriched kindergarten environments and outdoor play. Parental emotional intelligence, coping, resilience, and burnout were strongly predictive of children's outcomes, while socioeconomic status moderated the protective effects. Although pandemic repercussions were evident across all income levels, the impacts on executive functioning and emotional well-being varied. Overall, while children demonstrated adaptability, the pandemic intensified developmental vulnerabilities, underscoring the need for interventions that strengthen parental support, promote equitable access to enriching environments, and prioritize socio-emotional learning.

Keywords: COVID-19 pandemic; early childhood development; behavioral outcomes; parental factors; resilience; socioeconomic status

INTRODUCTION

The global disruption to everyday life caused by the SARS-CoV-2 pandemic and its associated restrictions had substantial consequences on the developmental trajectories of children. Early childhood represents a critical period for socio-emotional, cognitive, and behavioral development. During this period, children rely heavily on stable family structures, peer interaction, educational environments, and play opportunities (Smith, 2019). Pandemic-related factors, including lockdowns, school closures, and reduced social interactions, have given rise to concerns regarding the potential adverse impacts on the development and well-being of young children.

Recent studies have begun to reveal the risks and adaptive responses concerning the socio-emotional and developmental outcomes of children during the pandemic. A plethora of studies have highlighted many concerning issues, including increased anxiety, aggression, emotional regression, and language delays. Concurrently, reductions in school readiness, socialization opportunities, and practical life skills also occurred. Nevertheless, some children exhibited resilience, as evidenced by reports of diminished socio-emotional developmental risks within specific cohorts, and a favorable impact of enriched preschool environments and outdoor play opportunities. The role of family and parental characteristics, including emotional intelligence, coping strategies, resilience, burnout, and socioeconomic status, emerged as critical moderators shaping how children experienced the pandemic.

Such equivocal findings suggest the need for a systematic synthesis of the existing evidence to facilitate a profound comprehension of the pandemic's impact on the socio-emotional development of children and related domains. The present review collates and analyzes 13 studies published between 2020 and 2025 to examine how the pandemic affected the socio-emotional outcomes, school readiness, language, motor skills, and behavioral adjustment of young children, as well as the moderating influence of parental and environmental factors.

This review was conducted in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) 2020 guidelines, which provide a structured framework to ensure transparency and rigor in systematic reviews; the planning, screening, eligibility assessment, and inclusion of studies followed the PRISMA-expanded checklist. The review process is summarized in the PRISMA flow diagram, detailing the number of records identified, screened, excluded, and ultimately included in the synthesis.

The present study can inform the development of interventions and policy strategies, which may help mitigate developmental disparities and promote resilience in times of crisis.

METHODS

Eligibility Criteria

The present study incorporated peer-reviewed empirical studies (quantitative, qualitative, or mixed-methods) that examined the effects of the coronavirus pandemic (SARS-CoV-2) on early childhood development in children aged 3–7 years. Eligible studies focused on at least one developmental domain, including, but not limited to, the following: cognitive, language, social-emotional, motor, or psychological well-being. The selection of studies was based on the extent to which they addressed the direct or indirect exposure of children to the pandemic (e.g., infection, lockdowns, school closures, parental stress).

Empirical publications are the primary focus of the present study; therefore, it excludes literature focusing exclusively on medical or physical health outcomes, editorials, commentaries, narrative reviews, case studies, and other non-empirical publications. Article selection was limited to full studies written in English.

Information sources

The present literature search was conducted in two major bibliographic databases: Scopus and Web of Science, which were selected for their extensive coverage of peer-reviewed literature in psychology, education, and social sciences, which are all of pivotal significance to the subject under review.[1] A systematic search strategy was designed to ensure comprehensive coverage of the extant literature on the effects of the novel coronavirus (SARS-CoV-2) on early childhood development. The search was conducted in two major bibliographic databases, Scopus and Web of Science, as these provide extensive coverage of peer-reviewed studies in psychology, education, and social sciences.

Search strings were constructed by combining terms relating to three main concepts. First, the impact of the pandemic and the virus itself (SARS-CoV-2). Second, the early childhood population, with a particular focus on children aged 3 to 7. Third, developmental outcomes, including, but not limited to, cognitive, linguistic, social-emotional, and motor abilities. The application of Boolean operators (AND, OR, NOT) was instrumental in structuring queries and ensuring the capture of synonyms and related terms. Truncation (e.g., child, children, preschool) and phrase searching (e.g., "early childhood development") were also employed to maximize sensitivity.

In Scopus, the search was limited to English-language journal articles on psychology and sociology. It yielded 113 records. The present study excluded medical and clinical studies. The Topic Search (TS) field was utilized in Web of Science, and the results were restricted to English-language journal articles published between 2022 and 2025. The search yielded 231 records.[2] Table 1 provides the precise search strings and the number of records retrieved from each database.

[1] The search was concluded on 25 August 2025.
[2] All searches were completed on 25 August 2025.

Table 1. Search strings and number of records retrieved from the database

Database	Query	Articles
Scopus	TITLE-ABS-KEY(("covid-19" OR coronavirus OR "post-covid*" OR "post pandemic*" OR "long covid") AND ("early childhood" OR preschool* OR kindergarten* OR "aged 3-7" OR "young children") AND ("early childhood development" OR "child development" OR "developmental outcomes" OR "language development" OR "communication skills" OR "speech development" OR "socio-emotional development" OR "emotional development") AND ("effect*" OR "impact*" OR "outcome*" OR "consequence*" OR "delay*" OR "impair*") AND NOT ("adolescent*" OR teen* OR "high school" OR "student*" OR "adult*" OR "university" OR "college")) AND PUBYEAR > 2020 AND PUBYEAR < 2026 AND (LIMIT-TO (DOCTYPE,"ar")) AND (LIMIT-TO (SUBJAREA,"PSYC") OR LIMIT-TO (SUBJAREA,"SOCI")) AND (LIMIT-TO(LANGUAGE,"English"))	113
Web of Science	TS=("covid-19" OR coronavirus OR "post-covid*" OR "post pandemic*" OR "long covid") AND TS=("early childhood" OR preschool* OR kindergarten* OR "nursery school*" OR "aged 3-7" OR "young children") AND TS=("language development" OR "communication" OR "speech" OR "verbal skills" OR "emotional development" OR "emotional skills" OR "socio-emotional" OR "social-emotional") AND TS=("effect*" OR "impact*" OR "outcome*" OR "consequence*" OR "delay*" OR "impair*") AND PY=(2022-2025) AND DT=Article	231

Selection process

Records were identified through advanced queries in the selected databases and restricted to publications in English. Once the automatic and manual duplicate removal processes were complete, the remaining records were subjected to screening at the title and abstract level. The ASReview Lab machine learning tool was employed in combination with manual screening to support and accelerate this stage.

Two reviewers independently conducted the screening process by first calibrating their decisions on a random 10% subsample to ensure consistent application of the eligibility criteria. Discrepancies were addressed and resolved through consensus at this stage, leading to the refinement of the screening criteria. During the ASReview-assisted screening, the algorithm was seeded with a set of known relevant and irrelevant studies. All records that were deemed to be potentially relevant were subjected to a full-text assessment. Full texts were retrieved wherever possible, and each was assessed independently by two reviewers against the predefined inclusion and exclusion criteria. Disagreements were resolved through discussion, with a third reviewer available for arbitration if consensus was not reached. The final set of studies included in the systematic review was the result of a multi-step, dual-reviewed process, which ensured transparency, reproducibility, and minimization of selection bias.

Data collection process

The data were extracted into a structured Excel spreadsheet specifically designed for this review. Two reviewers performed the extraction independently and resolved discrepancies through discussion. The spreadsheet was piloted on a small number of studies to ensure clarity and consistency before thorough data extraction.

The Excel file contained predefined columns for the following: author(s), year of publication, country, sample size, age range of participants, study aims, methods employed, and main results. This format not only ensured that all relevant information was collected consistently but also facilitated systematic comparison and synthesis of the findings within the included studies.

Data items

Bibliographic details were extracted for each included study. These included author(s), year of publication, and country of publication, as these provide contextual information and allow comparison across geographical and temporal settings. Study characteristics, such as design, sample size, and the age range of participants, were recorded to assess the methodological rigor of the studies and ensure that the focus remained on children aged 3–7 years, as this developmental period is considered particularly sensitive to environmental disruptions. Information on the aims and methods of each study was collected to evaluate the relevance and appropriateness of the research approaches.

Concerning outcomes, data were extracted on the cognitive, linguistic, social-emotional, motor, and psychological domains of development. These areas were selected because they represent core dimensions of early childhood development that are susceptible to the effects of the pandemic. For instance, language and communication skills may be affected by reduced social interaction; social-emotional development by isolation and parental stress; cognitive development by interruptions to early education; and motor development and psychological well-being by restrictions on physical activity and social play. Collecting data on these outcomes enabled a comprehensive assessment of pandemic impacts on multiple facets of early childhood development.

Study risk of bias assessment

The methodological quality of the 13 included studies was appraised using design-appropriate critical appraisal tools. Quantitative studies were assessed with the Joanna Briggs Institute (JBI) Critical Appraisal Checklists, while qualitative studies were evaluated using the Critical Appraisal Skills Program (CASP). The Mixed Methods Appraisal Tool (MMAT) was applied for mixed-methods studies due to its suitability for evaluating integration of qualitative and quantitative components.

Two reviewers conducted all assessments independently; discrepancies were resolved through discussion. A detailed risk of bias table was produced (one row per study, summarizing judgments across key domains), thus ensuring transparency of individual-level appraisals.

Overall, the risk of bias ranged from low to moderate. Common limitations included the use of convenience samples, reliance on parent- or teacher-reported outcomes, and limited control of confounders in cross-sectional designs. Longitudinal studies provided stronger temporal validity but occasionally suffered from attrition bias. Qualitative studies offered rich contextual insights, though several lacked explicit reflexivity statements and strategies (e.g., triangulation, member checking) to enhance trustworthiness. Mixed-methods studies varied in the degree to which qualitative and quantitative strands were meaningfully integrated.

Such limitations were considered in the synthesis and contributed to GRADE downgrading decisions where relevant (e.g., for risk of bias and indirectness).

Effect measures

A range of effect measures were reported in the included studies due to the variety of study designs and outcomes. Quantitative studies assessed developmental outcomes, such as socio-emotional risk, language skills, executive functioning, and school readiness, using prevalence rates, proportions, mean differences, and standardized scores. Several studies reported associations through regression coefficients, odds ratios, and prevalence rate ratios (PRRs), while longitudinal studies often reported change scores and p-values to indicate the statistical significance of developmental trends over time. Mediation and moderation analyses were also applied in studies examining parental emotional intelligence, resilience, and socioeconomic status as potential influencing factors.

No single summary effect estimate could be calculated because the evidence base included both quantitative and qualitative studies. Instead, the reported effect measures were extracted and synthesised narratively, with emphasis placed on the direction and magnitude of the effects, as well as the consistency of the findings across different contexts.

Synthesis methods

Conducting a quantitative meta-analysis was not possible due to the heterogeneity of the study designs, populations, and outcome measures in the included literature. Instead, we conducted a structured narrative synthesis using the Synthesis Without Meta-analysis (SWiM) reporting framework. Studies were grouped by methodological orientation (quantitative, qualitative, or mixed methods) and then organized according to their

primary outcomes (language and communication, socio-emotional competence, motor competence, parenting and family resilience, and educational transitions).

We extracted the reported effect sizes (where available) for qualitative studies and the overall direction of effect for quantitative studies. Effect directions were coded as favorable, null/mixed, or unfavorable relative to hypothesized associations (e.g., better versus poorer developmental outcomes). We applied a majority rule approach to studies that reported multiple measures for the same outcome domain. Instances of divergence within studies were noted. We addressed the multiplicity of outcomes by extracting all relevant measures and synthesizing them at the domain level. Sensitivity checks were performed to determine whether the conclusions were influenced by a single large study or a particular measurement tool.

Qualitative findings were synthesized thematically using constant comparison, identifying recurrent patterns across the perspectives of parents, teachers, and children. Themes were iteratively refined through independent coding by two reviewers, followed by consensus discussions. Mixed-methods studies were incorporated into the quantitative (effect direction) and qualitative (thematic) syntheses depending on their respective components.

To explore potential sources of heterogeneity, we compared the findings according to the following factors: study design (cross-sectional versus longitudinal); geographic context (e.g., high-income versus middle-income countries); timing of data collection (early versus later pandemic phases); and measurement approach (standardized tools versus parent/teacher report). Judgements about risk of bias were integrated into the interpretation when inconsistencies appeared, and greater weight was given to studies with stronger methodological rigor (e.g., longitudinal or multi-informant designs).

The synthesis emphasizes both convergence and divergence across study types, highlights domains of higher and lower certainty, and identifies gaps in the evidence base for future research.

Reporting bias assessment

The potential for reporting bias was evaluated across the 13 included studies. Formal statistical methods such as funnel plots or Egger's test were not applicable due to the substantial heterogeneity in designs, outcomes, measurement approaches, and the absence of a quantitative meta-analysis. Similarly, ROB-ME (Risk Of Bias due to Missing Evidence) was not conducted, as it is designed primarily for meta-analyses of intervention effects.

Instead, reporting bias was assessed narratively. We examined (a) whether preregistration or published protocols were available, (b) the consistency between prespecified aims and reported results, and (c) the completeness and transparency of outcome reporting. Most studies did not provide preregistered protocols or trial registrations, which limited the ability to confirm whether all intended outcomes were reported. Only a subset of measured outcomes was presented in several cases, particularly in studies relying on multidimensional parent or teacher questionnaires. Selective emphasis on positive or negative aspects of children's experiences was noted for qualitative studies. Few studies described how themes were prioritized or whether negative cases were systematically considered.

While we did not identify conclusive evidence of systematic reporting bias, the limited availability of preregistration, the variability in reporting standards, and the tendency toward selective emphasis in qualitative work mean that outcome reporting bias cannot be excluded. This uncertainty was factored into the overall GRADE assessments, contributing to downgrading for potential publication or selective reporting bias where relevant.

Certainty assessment

Certainty of evidence was assessed using the GRADE framework, considering study design, risk of bias, inconsistency, indirectness, imprecision, and publication bias. Due to methodological heterogeneity, certainty ratings are reported at the level of outcome domains rather than pooled quantitative estimates.

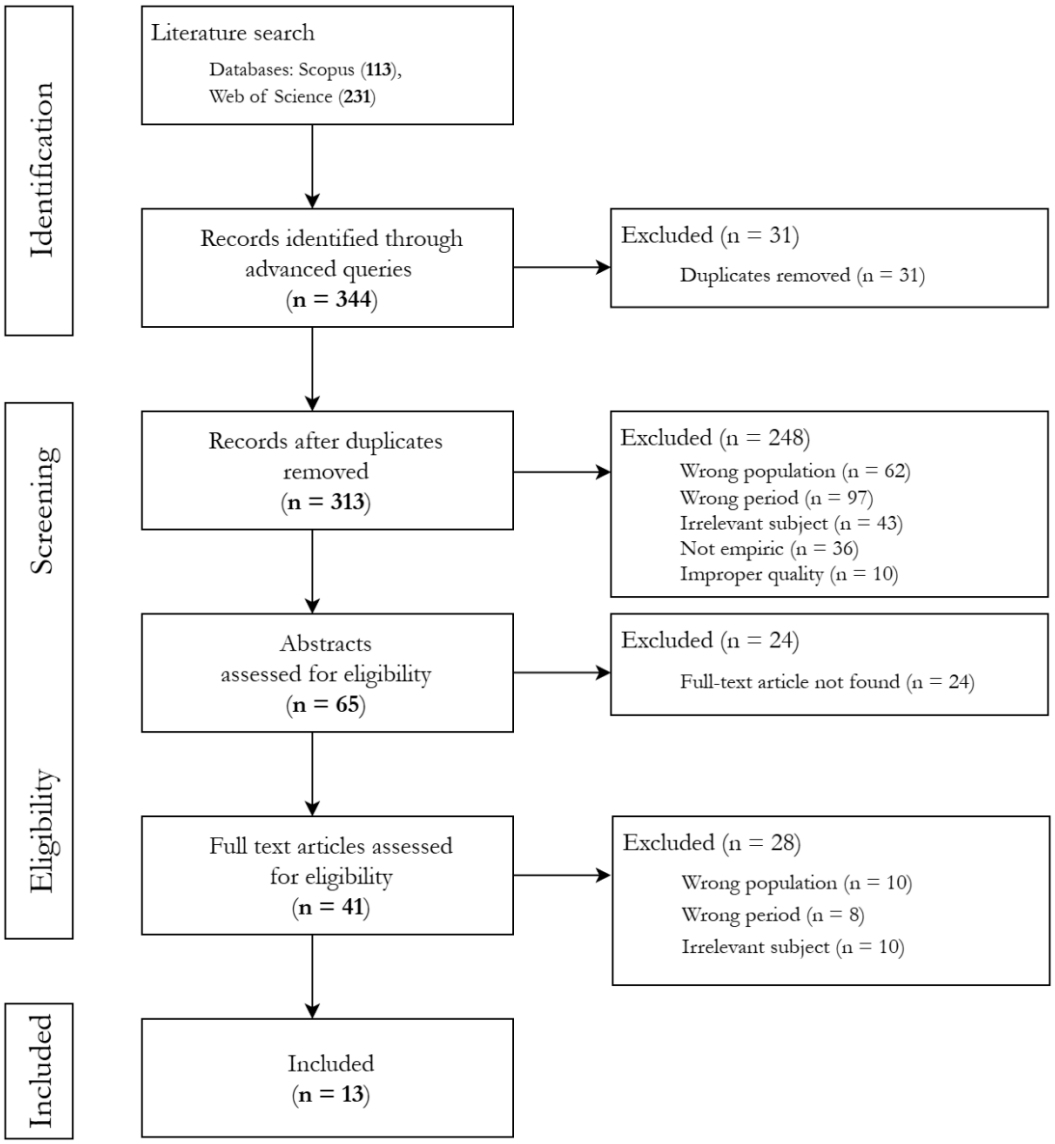
Table 2. Certainty of Evidence Across Outcome Domains (GRADE Assessment)

Socio-emotional development (e.g., anxiety, emotional symptoms, regression, resilience	
Evidence base	9 studies (large-scale surveys, longitudinal analyses, parent/teacher reports, qualitative data).
Findings	Consistent reports of increased emotional symptoms, anxiety, regression, and socio-emotional challenges, with some resilience noted in certain contexts.
Certainty	Moderate — downgraded for heterogeneity of measures and reliance on self-reports, but supported by multiple large, methodologically sound studies with converging findings.
School readiness and early learning outcomes	
Evidence base	3 studies (teacher surveys, longitudinal data).
Findings	Declines in readiness (literacy, regulation, routines), pandemic-related disadvantages in math, social-emotional skills, and executive function.
Certainty	Moderate to low — downgraded for the limited number of studies and contextual differences across education systems, but consistency across teacher reports and cohort comparisons.
Language development	
Evidence base	1 study (screening tool with 213 preschool children).
Findings	Post-pandemic increases in atypical language profiles, particularly among girls.
Certainty	Low — based on a single study in one country; findings are plausible and align with broader developmental literature but require replication.
Behavioral outcomes (aggression, externalizing behaviors, adaptability)	
Evidence base	3 studies (parent reports, correlational analyses, qualitative teacher/parent interviews).
Findings	Increased aggression and externalizing behaviors linked to child anxiety and parental factors; limited resilience was noted.
Certainty	Low to moderate — downgraded for methodological heterogeneity and reliance on parent-report measures; however, multiple converging findings increase confidence.
Motor skills and physical activity	
Evidence base	2 studies (kindergarten comparisons, parental reports of outdoor strategies).
Findings	Better motor outcomes in enriched PA environments; outdoor play strategies are beneficial but not fully compensatory.
Certainty	Moderate — supported by quantitative measures of motor competence, though sample sizes were small.
Parental and family factors (moderators of child outcomes)	
Evidence base	5 studies (large-scale surveys, correlational analyses, cross-sectional parental reports).
Findings	Parental emotional intelligence, coping, burnout, and resilience were strongly associated with children's socio-emotional and behavioral outcomes; SES moderated these relationships.
Certainty	Moderate to high — consistent, replicated findings across large samples (e.g., >29,000 parents in Xiang et al.), strengthening confidence despite some reliance on self-report.

RESULTS

The PRISMA flow diagram presented in Table 3 depicts the selection process the study employed. Following database searches and the elimination of duplicates, titles and abstracts were evaluated against a predetermined set of eligibility criteria. The full texts of potentially relevant articles were retrieved and assessed for inclusion. The flow diagram provides a transparent overview of the number of records identified, screened, excluded, and included in the final synthesis.

Table 3. The PRISMA Flow Diagram



Study characteristics

Table 4 provides a synopsis of the salient characteristics of the studies encompassed within the review. The following information is presented: authors, country, sample size, aims, methods, and results. This overview provides a basis for interpreting the evidence base, highlighting both the diversity and commonalities across studies.

Table 4. Characteristics of Studies

Authors / Country	Sample size	Aims	Methods	Results
Martin A., Clarke J., Johnstone A., et al. (2023) UK	227	To identify parental strategies enabling pre-school aged children to experience outdoor, natural environments during COVID-19 restrictions and to understand how contextual factors influenced parenting processes and child health outcomes.	Qualitative interview study; online survey	Eight parenting strategies were identified: (1) Using hand sanitizers, (2) Belief in outdoor play benefits, (3) Exploring local environments, (4) Organizing planned outdoor activities, (5) Purchasing new outdoor equipment, (6) Using public play parks once reopened, (7) Accessing gardens of family/neighbors, (8) Adopting outdoor activities offered by childcare providers.
Moreira M., Veiga G., Lopes F., et al. (2023) Portugal, USA	36	To examine the relationship between kindergarten physical/social environment and children's motor and social-emotional competence; to compare competences across kindergartens with differing PA affordances; to test hypothesis of significant differences.	Quantitative; standardized motor skills tasks and parent report	Children in kindergartens with higher PA affordances showed significantly better motor competence. No significant differences in social-emotional competence were found.
Durgut-Sakrucu E., Demircioğlu H. (2024) Türkiye	293	To examine roles of anxiety and parental resilience on preschool children's aggressive tendencies during the pandemic; to test relationships between aggression, anxiety, and resilience.	Quantitative, relational model	Positive correlations were found between children's aggression and anxiety. Parents' resilience scores correlated weakly with aggression and anxiety. Regression showed no direct resilience effect, but anxiety remained associated with aggression.
Kyvrakidou E., Kyvrakidis G., Stefanaki A.S., et al. (2025) Greece	213	To investigate pandemic effects on preschool children's language skills; to test whether atypical language skill rates differed across time; to examine gender differences.	Quantitative, retrospective cohort; Greek adaptation of ERTL4	Significant increase in atypical language profiles after the pandemic. Girls had higher prevalence than boys. Some expressive skills improved during the pandemic compared to before/after.
Zwönitzer A., Rost K., Fegert J.M., et al. (2023) Germany	129	To explore connections between the pandemic, child attachment, and emotional health; to test the influence of attachment on emotional problems.	Quantitative, online survey and Strange Situation Test	Attachment quality significantly influenced emotional problems. Time × attachment interaction was significant. Girls had higher emotional problem scores.
Prino L.E., Arace A., Zonca P., et al. (2023) Italy	358	To analyze emotional symptoms in children aged 2–6 years during the pandemic; to examine gender differences; to investigate parental burnout, coping, and protective factors.	Quantitative	Parental burnout predicted children's emotional symptoms. For girls, maladaptive coping related to more symptoms; for boys, parental promotion of emotional competence was protective.
Le V.N., Schaack D., Cisneros C.,	662	To compare kindergarten readiness of pandemic-affected vs. pre-pandemic children; to assess	Quantitative, longitudinal design	Pandemic-affected cohort showed 11–18 pp disadvantages in math, socio-emotional, and EF outcomes. Disadvantages

Gregory J. (2025) USA		differences in cognitive, social-emotional, and EF outcomes; to test variation by family income.		observed across income levels, with differences in how loss of preschool affected groups.
Egan S.M., Pope J., Moloney M., et al. (2021) Ireland	506	To examine socio-emotional effects of pandemic-related closures on young children in Ireland; to gather parental insights during lockdown; to analyze online parental survey data.	Quantitative + qualitative; online PLEY Survey	Most children missed friends, play, and routines. Parents reported tantrums, anxiety, clinginess, boredom, and under-stimulation during closures.
O'Brien C., Egan S.M. (2025) Ireland	5	To explore the impact of restrictions on young children's play; to examine teachers' experiences of changes; to test effects of COVID-19 on play and socio-emotional development.	Qualitative, semi-structured interviews	Teachers emphasized play's importance for learning and socio-emotional development. Restrictions reduced play opportunities in school.
Watts R., Pattnaik J. (2023) USA, India, China, Scotland	15	To explore teachers' and parents' perspectives on distancing/school closures and children's socio-emotional/practical skills development.	Qualitative, phenomenological inquiry	Teachers and parents reported children had socio-emotional challenges (social deprivation, emotional issues, externalizing behaviors) and life-skill acquisition difficulties.
Murphy K., Giordano K., Deloach T. (2023) USA	154	To describe teacher perceptions of school readiness during the pandemic; to examine readiness domains/goals; to test factors associated with perceptions.	Quantitative, online survey	Teachers reported readiness worse than pre-pandemic. Biggest struggles: emotional regulation, classroom rules, literacy skills.
Kästner A., Ernst V.S., Hoffmann W., Franze M. (2023) Germany	786	To assess changes in preschoolers' social-emotional developmental risks (SE-DR) before and after the first COVID-19 wave; to analyze long-term pandemic effects.	Quantitative, longitudinal cohort (DESK 3–6 R)	Proportion of children with SE-DR dropped from 18.2% (2019) to 12.4% (2020, post-wave), p=0.001.
Xiang J., Wu J., Lian C., Lin X. (2025) China	29550	To examine the relationship between quarantine duration and children's anxiety; to test mediation of parents' emotional intelligence; to test moderation by family SES.	Quantitative, online questionnaire	Longer quarantine reduced anxiety. Parents' EI mediated 51.8% of effect. Family SES moderated the mediation, with stronger benefits in higher-SES families.

Results of individual studies

Xiang et al. (2025) investigated the effects of home quarantine duration, parental emotional intelligence, and family socioeconomic status (SES) on children's anxiety during the pandemic by surveying 29,550 parents. The study found that a longer quarantine period significantly reduced anxiety in children. Parents' emotional intelligence mediated the relationship between quarantine days and children's anxiety, which explains 51.79% of the effect. Family SES moderated the mediating effect of parents' emotional intelligence on children's anxiety, benefiting higher-SES families more than lower-SES families. The study also found that children's adaptation during the quarantine period demonstrates psychological resilience. Xiang et al. (2025) concluded that the mediating effect of parents' emotional intelligence accounted for 51.79% of the total effect of quarantine duration on children's anxiety, with longer quarantine periods associated with decreased anxiety. They also noted that family socioeconomic status moderated this effect, which benefited higher-socioeconomic-status families more than

lower-socioeconomic-status families. To alleviate anxiety, the authors suggest that policies should focus on supporting families with lower socioeconomic status and enhancing parental emotional skills.

Kästner et al. aimed to assess changes in preschoolers' social-emotional developmental risks (SE-DR) from before the pandemic to after the first COVID-19 wave using longitudinal DESK data from 3- to 4-year-old children. The study found that the proportion of children with SE-DR decreased from 18.2% in the pre-pandemic DESK-SW3 to 12.4% in DESK-SW4 after the first COVID-19 wave ($p = 0.001$). The prevalence rate ratio (PRR) was 0.68, representing a notable improvement compared to previous survey waves (SW1-SW2: PRR = 0.88; SW2-SW3: PRR = 0.82). The ratio of the improvement rate divided by the deterioration rate was 9.31, indicating that the proportion of children who improved was 9.31 times higher than the proportion of children who deteriorated. Kästner et al. also contextualized the results by conducting two additional longitudinal analyses using data from previous assessments comparing 2017 to 2018 (DESK-R-SW-1 to DESK-R-SW-2, N = 979) and 2018 to 2019 (DESK-R-SW-2 to DESK-R-SW-3, N = 948). The proportion of 3- to 4-year-old children with developmental risk/inconclusive findings decreased in both longitudinal comparisons with a PRR = 0.88 ($p = 0.287$) for DESK-R-SW-1 to DESK-R-SW-2 and a PRR = 0.82 ($p = 0.092$) for DESK-R-SW-2 to DESK-R-SW-3. The authors highlight that they did not detect any deterioration in the prevalence rate ratio after the first COVID-19 wave compared to earlier survey waves.

Murphy et al. (2023) examined the perceptions pre-kindergarten and kindergarten teachers had of school readiness during the COVID-19 pandemic. The study found that nearly 80% of teachers observed overall student functioning to be worse or much worse than before the pandemic, with no teachers reporting that functioning was much better overall. Teachers most frequently identified the Ready to Learn and Social-Emotional Development domains as the areas of greatest struggle for their students, while Physical Development was the least frequently reported. Chi-square tests revealed no significant relationships between teacher demographics and overall school readiness or the domain of greatest struggle. According to the study, teachers reported that children struggled most with emotional regulation, adhering to classroom rules and routines, and literacy skills. When asked if their children would be ready for the next grade, the majority of teachers provided affirmative answers; however, the reasoning behind this endorsement was more varied. Some teachers described how children were ready, while others suggested that the social-emotional development of students was lower than their academic readiness.

In a qualitative study conducted in the fall of 2020, Watts and Pattnaik explored the perspectives of teachers and parents on how the COVID-19 pandemic impacted the socioemotional development of young children. The study included four American preschool teachers, four international preschool teachers, three American kindergarten teachers, and four American parents. The interviews revealed that children experienced social deprivation, including a lack of friendships, peer learning, playtime, and socialization, all of which negatively impacted their socialization skills, higher-order thinking, mental health, and activity levels. Participants also noted externalizing behaviors like acting out, tantrums, seeking negative attention, aggression, and lying, as well as difficulties in acquiring life skills and over-reliance on parents. Teachers of 5-year-olds reported lower fine motor skills in their students. Watts and Patnaik's findings suggest that the pandemic led to academic learning loss and socioemotional challenges in young children. Participants noted issues such as loneliness, anxiety, and difficulties in developing skills like conflict resolution and creative thinking. Kindergarten teachers observed delays in expected social, emotional, and practical life skills compared to previous years. Parents reported emotional regression in their children, with behaviors such as whining and attention-seeking. The authors suggested that post-pandemic ECE curricula should prioritize socioemotional development and practical life skills to promote the overall well-being of children. They also recommended future mixed-method studies in multi-country contexts to evaluate the impact of interventions.

O'Brien and Egan examined teacher perspectives on play at school and the socio-emotional development of young children during COVID-19 restrictions. The study involved semi-structured interviews with five primary school teachers of children aged 4–8 years in Ireland in February 2022. Thematic analysis highlighted the importance teachers place on play, the effects of COVID-19 restrictions on play, and the impact on the socio-emotional development of children, especially due to mandatory small groups or 'pods.' Teachers reported that restrictions disrupted children's natural playful peer interactions, limited the teaching of socioemotional skills, and created barriers to using play for academic learning. The findings indicated that the COVID-19 restrictions negatively impacted children's play opportunities and socio-emotional development. Teachers noted that the pod system, while intended to limit contact, hindered the development of positive relationships outside the pods and classes. Teachers also found it more challenging to teach socioemotional skills such as sharing and conflict resolution due to hygiene measures. The study suggests the need for further research to determine the lasting impacts of school closures and hygiene restrictions on the development of young children.

Egan et al., a study involving 506 parents of children aged 1–10 years in Ireland during the COVID-19 lockdown in May and June 2020, revealed that most children missed their friends, playing with other children, and the routine and structure of ECEC and school settings. Parents reported that the closure of these settings negatively

impacted their children's social and emotional well-being, leading to issues like tantrums, anxiety, clinginess, boredom, and under-stimulation. The researchers also found that girls had higher scores than boys for missing school and missing their friends, while younger children (aged 1–5 years) had significantly higher scores for missing ECEC. However, Egan and colleagues also noted that some parents reported positive aspects of the lockdown, such as increased time for children to play with siblings and a break from the usual routine. While the findings indicate that children's socio-emotional development was severely disrupted during lockdown, with a variety of negative impacts, this experience was not universal. Moreover, the findings suggest that families missed the nurturing environment provided by ECEC programs that supported their children's socio-emotional development, as well as the structure and routine afforded by their children's participation in early childhood programs.

Le et al. (2025) conducted a longitudinal study analyzing data from before and after pandemic-related preschool closures. They compared the kindergarten readiness of children whose preschool experiences were interrupted by the pandemic with that of pre-pandemic children with typical preschool experiences. The study revealed pandemic-related disadvantages in early math, social-emotional skills, and executive functioning, with the pandemic-affected cohort showing deficits of 11 to 18 percentage points. These developmental disadvantages were observed across all income levels. Furthermore, Le et al. (2025) found suggestive evidence that the loss of preschool affected social-emotional and executive functioning skills differently for children from lower- and higher-income groups, although these differences were not always statistically significant. Specifically, pandemic-affected children from lower-income households showed a moderately large disadvantage in working memory, while those from higher-income households showed a significant lag in inhibition. The authors emphasize the wide-ranging deleterious effects of the pandemic, advocating for developmentally appropriate solutions and initiatives designed to support both early cognitive skills and social-emotional learning.

Prino et al. (2023) investigated the associations between parental characteristics (coping strategies, parental burnout, resilience, perception of social support, and promotion of children's social-emotional competence) and children's emotional symptoms, considering gender differences. The study included 358 parents of children aged 2 to 6 years. The results indicated that parental burnout is a predictor of emotional symptoms in children. Furthermore, the study found gender-specific associations: higher levels of emotional symptoms in females were associated with parental maladaptive coping strategies, while for males, the parents' ability to promote children's emotional competence was a protective factor. Parental burnout emerged as a predictor of emotional symptoms for both boys and girls; however, the specific dimensions of burnout that predict emotional symptoms linked to the gender of children, which, in the case of sons, the feeling of not being as good a parent as one used to be and shame around one's parenting that is a predictor of emotional symptoms, while for daughters, it is the feeling that the parental role is emotionally draining and that parenting requires too much commitment. Prino et al. (2023) also found that the coping strategies adopted by parents during the pandemic were predictive of emotional symptoms, particularly for daughters, where maladaptive coping strategies were associated with higher emotional symptoms. For boys, emotional symptoms were predicted by parental burnout and familial protective factors, specifically the parental ability to promote social and emotional competence. The study emphasizes the importance of supporting parental well-being as a critical factor in protecting children from the adverse effects of stressful situations. The authors concluded that interventions aimed at supporting parents may have cascading benefits for children's mental health, particularly in times of crisis.

Zwönitzer et al. (2023) analyzed the association between attachment security, emotional problems, and the impact of the SARS-CoV-2 pandemic on preschool children in Germany. The study, involving 129 mother-child dyads, used the Strengths and Difficulties Questionnaire (SDQ) to assess children's emotional problems and the Strange Situations Test (SST) to determine attachment quality. The study found that attachment quality had a significant influence on children's emotional problems [$F(2, 121) = 4.01$, $p = .021$], and the interaction between time (during the pandemic) and child attachment was also significant [$F(3.45, 208.42) = 3.58$, $p = .011$]. Furthermore, Zwönitzer et al. (2023) also found that reported emotional problems were significantly higher in girls than in boys $F(1, 118) = 4.56$, $p = .035$). The study indicated that the emotional problems of all children increased during the pandemic, with disorganized, attached children reported as being more emotionally stressed during the first lockdown. The authors concluded that the findings highlight the need for preventive services aimed at promoting stress coping skills in children and parents to maintain children's mental health during crises.

Kyvrakidou et al. investigated the impact of the COVID-19 pandemic on the language skills of preschool children in Greece. The study involved 213 preschool-aged children, assessing their language skills via a screening tool before, during, and after the pandemic. The findings revealed a significant increase in children with atypical language skills profiles after the pandemic compared to those assessed before and during. Specifically, girls exhibited a more pronounced increase in atypical language skill profiles after the pandemic. The study highlights the negative impact of the pandemic on early language development, aligning with findings from previous research that emphasize the detrimental effects of factors like reduced social interaction, mask-wearing, and increased screen time. Furthermore, Kyvrakidou et al. noted an increase in the number of successfully produced or repeated words

and pseudowords, along with enhanced expressive abilities, during the pandemic compared to the periods before and after. Statistically significant differences were identified in the boys subgroup solely in modes of expression during the pandemic. In contrast, girls demonstrated a significant increase not only in their expression but also in the usage of words and pseudowords during the same period. These findings suggest complex and gender-specific effects of the pandemic on language skills, with potential factors including disruptions in social interaction, altered learning environments, and increased parental stress playing a role. The authors underscore the need for further research to explore the specific pandemic-related factors affecting language competency and to develop personalized interventions to support healthier developmental outcomes.

Durgut ¸Sakrucu and Demircio˘glu (2024) aimed to determine the related role of anxiety and parental resilience on the aggressive tendencies of preschool children during the COVID-19 pandemic. The study, involving 293 parents with children aged 4–6 years, revealed a positive relationship between children's aggression tendencies and anxiety levels. Additionally, weak to moderate correlations were observed between parents' resilience scores and children's aggression and anxiety scores. The researchers used Pearson and Spearman correlation analysis to evaluate relationships between the Preschool Anxiety Scale, Aggression Orientation Scale, and Brief Resilience Scale total and subscale scores. Although linear regression analysis indicated no significant effect of parental resilience on children's aggressive tendencies, anxiety levels may be related. Furthermore, the study results showed that the physical aggression tendencies of children differed according to their age and the number of children in the family, albeit at a low level. According to Durgut ¸Sakrucu and Demircio˘glu, these results underscore the importance of considering anxiety and parental resilience in understanding aggressive tendencies in preschool children, particularly during crises like the COVID-19 pandemic. Durgut ¸Sakrucu and Demircio˘glu suggested that further studies are needed to identify factors associated with aggression in preschool children.

Moreira et al. (2023) examined the relationship between the quality of kindergarten physical and social environments in promoting physical activity (PA) and preschoolers' motor and social-emotional competence. The study involved two Portuguese kindergartens, one with high PA practices (KG-high) and the other with low PA practices (KG-low). Thirty-six children without neuromotor disorders participated. The researchers assessed motor and social-emotional competence using standardized motor skills tasks and parent reports of child behaviors. The results indicated that children from the kindergarten with higher compliance with PA best practices (KG-high) showed significantly better motor competence compared to those from KG-low. However, no statistically significant differences were found in social-emotional competence scores between the two groups. These findings emphasize the critical importance of kindergarten environments in promoting preschoolers' motor competence by ensuring a physical and social environment that enhances their PA practice. Moreira et al. (2023) found that children in a PA-friendly kindergarten (meeting more best practices) had better motor competence. These findings align with previous research and support the idea that the kindergarten's physical space characteristics, policies, and daily practices can facilitate or inhibit factors influencing children's motor competence. The EPAO-sr total PA score for the KG-high program was highest out of all 17 programs, with the score for KG-low being in the bottom third of all scores. MCA scores were 30%-70% higher for children attending KG-high compared to KG-low. Results indicated these differences were statistically significant and had a large effect size for total motor competence ($t(34) = -3.63$, $p = 0.004$, $d = 1.21$) and manipulative skills ($t(34) = -3.65$, $p = 0.001$, $d = 1.22$). These aspects are interrelated and dependent on each other, since children's increase and diversity of fields of action for active play and physical activity, both with and without adult prompting, depend on the material and social features and layers of the environment. A play setting conducive to PA that is accompanied by a flexible and permissive approach by adult providers is fundamental for children to engage in enriched active play opportunities, which is one of the key aspects for improving both PA and motor competence. Therefore, we believe that differences between the two centers studied influence the types and amounts of PA children chose from day to day.

Martin et al. (2023) conducted a qualitative study to identify parental strategies that enabled pre-school-aged children to experience outdoor, natural environments during COVID-19-related restrictions on free movement and social interactions by applying the Individual and Family Self-Management Theory. The study found eight facilitating parenting strategies: (1) Using hand sanitizers when playing outdoors, (2) Believing in the benefits of outdoor (nature) play and activities, (3) Exploring the local outdoor environment as a family compensating for a lack of scheduled indoor activities, (4) Organizing planned outdoor activities as a family or for children only, (5) Purchasing new outdoor (play) equipment, (6) Use of public play parks/equipment as soon as they reopened, (7) Using family members' or neighbors' garden space when social interaction with another household was allowed again, and (8) Adopting outdoor activities offered by formal childcare providers. Martin et al. (2023) also reported that while these parenting strategies resulted in more outdoor time for children, parents/carers reported that children spent less time playing outside. More outdoor time was perceived to benefit children's movement skills but not their overall physical activity. Time outdoors helped some children maintain or regain emotional and mental health, which had decreased due to fewer outdoor play opportunities with other children or adults from other

households. Hindering parenting strategies included (1) cutting down outdoor time in busy playparks, (2) avoiding outdoor experiences during wet and rainy weather, and (3) avoiding the introduction of new activities outdoors while restrictions were in place.

Result of syntheses

Given the heterogeneity of designs, outcomes, and populations, the 13 included studies were synthesized narratively across five thematic domains: language and communication, socio-emotional outcomes, motor competence, parenting and family resilience, and educational transitions. Quantitative findings were summarized by direction of effect and statistical outcomes, while qualitative evidence contributed to thematic insights.

Language and communication

One study (Kyvrakidou et al.) reported a significant increase in preschoolers with atypical language profiles after the pandemic, with more pronounced effects among girls. Boys showed changes mainly in expressive modes, whereas girls demonstrated broader vulnerabilities across expressive and lexical domains. These findings indicate a negative pandemic impact on language skills, with gender-specific trajectories.

Socio-emotional outcomes

Evidence from multiple large-scale surveys and teacher/parent reports consistently indicated heightened socio-emotional challenges. Xiang et al. found that longer quarantine duration unexpectedly reduced children's anxiety, mediated by parental emotional intelligence (explaining 51.79% of the effect) and moderated by socioeconomic status. Zwönitzer et al. reported increased emotional problems, especially among girls and children with disorganized attachment, during the first lockdown. Egan et al. and Watts and Pattnaik highlighted widespread issues such as tantrums, clinginess, anxiety, loneliness, regression, and loss of peer play opportunities, with teachers noting poorer socio-emotional skills compared to pre-pandemic cohorts. O'Brien and Egan described how hygiene measures and pod systems restricted natural peer play, limiting socio-emotional learning opportunities such as sharing and conflict resolution. Conversely, Kästner et al. reported a reduction in socio-emotional developmental risks in 3–4-year-olds after the first COVID-19 wave, suggesting resilience in certain cohorts. Collectively, the evidence demonstrates overall increased socio-emotional vulnerability, albeit with pockets of adaptation.

Motor competence and physical activity.

Moreira et al. found that children in a kindergarten with strong physical activity practices exhibited significantly higher motor competence (large effect sizes for total motor competence and manipulative skills) compared to peers in a low-PA kindergarten. Martin et al. identified eight parental strategies that facilitated outdoor play, such as using local green spaces, buying outdoor equipment, and resuming playpark use after reopening. Parents perceived these strategies as beneficial for movement skills and emotional well-being, though overall outdoor play time remained reduced relative to pre-pandemic levels. Together, these studies suggest that enriched environments and supportive parental strategies mitigated some pandemic-related restrictions on children's physical development.

Parenting and family resilience

Several studies highlighted the role of parental and family-level factors in shaping child outcomes. Xiang et al. showed that parental emotional intelligence mediated anxiety outcomes, with stronger protective effects in higher-SES families. Prino et al. found that parental burnout predicted children's emotional symptoms in both boys and girls, with gender-specific patterns: daughters were affected by parents' emotional exhaustion, while sons were affected by parents' feelings of inadequacy and shame. Maladaptive coping strategies were linked to worse outcomes for daughters, whereas the ability to promote emotional competence protected boys. Durgut Sakrucu and Demircioğlu reported that children's aggression was positively related to anxiety, and weak-to-moderate correlations were found between parental resilience and child aggression/anxiety, although regression models did not identify resilience as a significant predictor. Collectively, these findings emphasize the vital importance of parental well-being, coping, and emotional resources in moderating children's developmental risks during the pandemic.

Educational transitions and school readiness

Murphy et al. reported that nearly 80% of pre-kindergarten and kindergarten teachers perceived children's functioning as worse than before the pandemic, especially in readiness-to-learn and socio-emotional domains, though most still considered children ready for the next grade. Le et al. identified pandemic-related disadvantages of 11–18 percentage points in kindergarten readiness, particularly in early math, social-emotional skills, and executive functioning. Lower-income children were more disadvantaged in working memory, while higher-income peers lagged in inhibition. These findings align with broader reports from teachers and parents on academic delays and socio-emotional immaturity, indicating that pandemic disruptions hindered smooth educational transitions for many children.

Convergence and divergence

Across domains, the synthesis highlights convergence in identifying negative socio-emotional impacts, school readiness concerns, and the protective role of parental and environmental supports. Divergences emerged in the socio-emotional domain, where some cohorts (Kästner et al.) demonstrated reduced developmental risks, contrasting with broader reports of deterioration. Thematic findings from qualitative studies aligned with quantitative evidence, strengthening confidence in reported trends. However, limitations included reliance on self-report measures, small sample sizes in some qualitative studies, and limited generalizability across cultural contexts.

Reporting biases

Formal statistical assessment of reporting bias, such as funnel plots or Egger's test, was not feasible due to the heterogeneity of study designs, outcome measures, and the absence of a meta-analysis. Instead, potential selective reporting was assessed narratively. Across the 13 included studies, few had preregistered protocols or publicly available methodological plans, limiting the ability to verify whether all intended outcomes were reported. In several cases, particularly within qualitative studies, the emphasis on either positive or negative aspects of children's experiences was not accompanied by a clear justification of how themes were prioritized, raising the possibility of selective thematic emphasis. In quantitative studies, outcomes were reported consistently with stated aims; however, incomplete detail on nonsignificant findings suggested potential underreporting. Although no direct evidence of systematic reporting bias was detected, the overall lack of preregistration, variability in methodological transparency, and inconsistent reporting standards across studies mean that selective reporting cannot be excluded.

Certainty of evidence

The certainty of evidence was assessed using the GRADE approach across the main outcome domains (socio-emotional outcomes, parental factors, educational readiness/executive function, language and communication, motor competence, and behavioral difficulties). Certainty ratings considered the five standard GRADE domains: risk of bias, inconsistency, indirectness, imprecision, and publication bias.

Overall certainty ranged from low to moderate. Evidence for socio-emotional outcomes and parental factors was judged to be of moderate certainty, supported by multiple studies, including some longitudinal designs, with consistent findings. However, these domains were downgraded once for risk of bias due to reliance on parent- and teacher-reported measures and limited preregistration.

Evidence regarding educational readiness and executive function was rated low to moderate. While findings were relatively consistent across teacher-reported and longitudinal data, downgrades were applied for imprecision (modest sample sizes in some studies) and selective reporting concerns.

The certainty of evidence for language and communication, as well as for behavioral difficulties, was rated low. These domains were based on a small number of studies with heterogeneous measures and, in some cases, indirectness (outcomes not restricted to the predefined 3–7 age group). They were downgraded for inconsistency, imprecision, and suspected publication bias.

Motor competence outcomes were judged to have low to moderate certainty. Findings were consistent in direction but based on a few studies with small sample sizes, leading to downgrades for imprecision. While no systematic reporting bias could be conclusively identified, the lack of preregistered protocols across most included studies justified downgrading for potential publication or selective reporting bias in several domains.

DISCUSSION

This systematic review synthesized findings from 13 studies examining the socioemotional, cognitive, and developmental impacts of the COVID-19 pandemic on young children, as well as the moderating roles of family, educational, and contextual factors. The evidence consistently demonstrates that the pandemic posed significant risks to children's emotional well-being, school readiness, and developmental trajectories, while also highlighting resilience and adaptive responses under certain conditions.

Across several studies, parental characteristics emerged as central determinants of children's outcomes. Xiang et al. (2025) demonstrated that parents' emotional intelligence mediated the relationship between quarantine duration and children's anxiety, accounting for over half of the total effect, while socioeconomic status moderated this pathway in favor of higher-SES families. Similarly, Prino et al. (2023) showed that parental burnout and coping strategies predicted children's emotional symptoms, with gender-specific associations, whereas Zwönitzer et al. (2023) identified attachment security as a key factor in moderating emotional problems during lockdown. Taken together, these findings underline the family context as both a protective and risk factor, suggesting that interventions targeting parental well-being and emotional competence may have cascading benefits for children. At the same time, Durgut Şakrucu and Demircioğlu (2024) noted that parental resilience was only weakly related to children's aggression, suggesting that protective factors may not uniformly buffer against all types of socioemotional risks.

The pandemic also affected children's cognitive, language, and school readiness outcomes. Le et al. (2025) documented substantial disadvantages in early math, social-emotional skills, and executive functioning among children whose preschool experiences were disrupted, with some evidence of income-related differences in specific executive functions. Kyvrakidou et al. (2023) reported a significant post-pandemic increase in atypical language profiles, particularly among girls, which they linked to reduced social interaction and increased screen exposure. Murphy et al. (2023) further corroborated these findings from the perspective of educators, who overwhelmingly perceived declines in children's readiness to learn, particularly in emotional regulation and adherence to classroom routines. Collectively, these findings indicate persistent challenges in children's preparedness for formal schooling, raising concerns about long-term academic trajectories.

Qualitative evidence provided important insights into the lived experiences of teachers and parents during the pandemic. Watts and Pattnaik (2023), O'Brien and Egan (2022), and Egan et al. (2020) highlighted the disruption of peer play, loss of social learning opportunities, and increased emotional regression as salient outcomes of lockdown and restrictions. Parents often observed heightened anxiety, clinginess, and tantrums, though some reported positive experiences, such as stronger sibling bonds and more time for family activities. These ambivalent perceptions underscore the heterogeneity of children's experiences and the contextual factors shaping whether the pandemic environment was primarily detrimental or, in some cases, a source of adaptation and connection.

The importance of play and physical activity emerged repeatedly. Moreira et al. (2023) found that children in kindergartens with stronger physical activity practices demonstrated significantly higher motor competence, while O'Brien and Egan (2022) observed that restrictions, such as pod systems and hygiene rules, curtailed peer play, and reduced opportunities for teaching socioemotional skills like sharing and conflict resolution. Martin et al. (2023) provided a complementary perspective, showing how parents employed adaptive strategies to maintain outdoor play opportunities, which were perceived to support children's movement skills and, to some extent, their emotional health. Together, these findings stress the centrality of play and physical environments in supporting holistic development during times of crisis.

Although most studies emphasized developmental risks, evidence of resilience and even improvement was also noted. Kästner et al. (2020) reported a decrease in the proportion of children at socioemotional developmental risk after the first pandemic wave, suggesting that some children may have benefited from more time at home or alternative caregiving arrangements. Xiang et al. (2025) similarly noted that longer quarantine periods were paradoxically associated with reduced child anxiety, mediated by parental emotional intelligence, pointing toward children's adaptive capacities when family support is present. These findings complicate narratives of universal decline and emphasize the need to account for individual, familial, and contextual heterogeneity.

Taken together, the evidence indicates that the pandemic's effects on young children were not uniform but were mediated by a complex interplay of parental well-being, socioeconomic resources, attachment quality, and educational environments. Children's resilience was evident in some domains, yet the cumulative risks to socioemotional, language, and school readiness outcomes highlight urgent needs for policy and practice. In particular, interventions should prioritize supporting parents' emotional and mental health, strengthening socioemotional learning in early education, and ensuring access to high-quality play and physical activity opportunities. Longitudinal research is required to assess whether observed deficits in readiness, language, and emotional regulation persist into later schooling, and whether adaptive strategies identified during the pandemic can be scaled to buffer against future crises.

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